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(12) **ABSTRACT OF INVENTION**

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(54) **COLLAPSIBLE CUP**

(57) **Abstract**

FIELD drinking in home and field conditions, as well as in public catering enterprises. SUBSTANCE collapsible cup has conical vessel with resilient side wall provided with rigid ribs. Ribs are arranged so that inner diameter of each subsequent rigid rib, beginning from cup base, exceeds

outer diameter of previous rib, with difference between inner diameter of subsequent rib and outer diameter of previous rib being at least equal to two thicknesses of cup side wall. EFFECT: increased convenience in usage and simplified construction. 4 cl. 9 dwg

This invention deals with containers designed for drinking, storing and transporting liquid and non-liquid products and materials, as well as for application as lids for other containers.

The prototype of this invention is a camping utensil containing a conical vessel made of a resilient material and provided with rigid ribs which are evenly distributed along the utensil's height, wherein the inner diameter of each subsequent rib, beginning from the base, is larger than the outer diameter of the preceding rib. The utensil may contain a case consisting of two halves [sic! style], wherein the case's halves have, on the sides facing each other, locking elements and ring-shaped protuberances which are distributed with a shift so that the protuberances of one of the halves are located between the protuberances of the other half.

A disadvantage of the known utensil is that its construction, built in full accordance with the invention's formula, does not always facilitate the utensil's collapsibility. The utensil's collapsibility is not provided in the case when the inner diameter of each subsequent rigid rib, beginning from the base of the utensil's vessel, is larger than the outer diameter of the preceding rib by a value smaller than two thicknesses of the vessel side wall. Moreover, the conical form of the utensil's vessel side wall does not contribute to the precision of its collapsibility. In addition, the possibility of increasing of the utensil's stability in its extended position has not been provided.

The essence of the invention is that the collapsible container, having a conical vessel, the side wall of which is made of a resilient material and is provided with rigid ribs made so that the inner diameter of each subsequent rigid rib, beginning from the base, exceeds the outer diameter of the preceding rib, and the difference between the inner diameter of the subsequent rib and the outer diameter of the preceding rib is equal to at least two thicknesses of the vessel side wall. Such difference in the diameter in collapsed position of the container provides secured distribution of the deformable resilient portions of the vessel side wall between the rigid ribs, which allows the achievement of the technical result consisting in providing secured collapsibility of the container.

The essence of the invention is also that the longitudinal section of the resilient portions of the vessel side wall, which are fixed between the rigid ribs, has either a convex, concave, or sinusoid-like form. This allows obtaining the technical result consisting in the increased convenience of collapsing the container due to the precise deformability of the resilient portions of the container's vessel.

The essence of the invention is also that the container is provided with a case containing, on its inner surface, a ring-shaped protuberance, while the vessel has a ring-shaped collar on its base, wherein the matching sizes of the case's ring-shaped protuberance and ring-shaped collar of the vessel form a tight fitting of the vessel on the case. This allows the achievement of the technical result consisting in solving the issue of increasing the stability of the container in the extended position.

Moreover, the essence of the invention is also that the lower rigid rib or the container's vessel base contains one or more gripping elements. This creates the possibility of gripping the lower part of the container's vessel when the container is extended and thus eliminates the necessity of touching the inner surfaces of the container's vessel. This allows obtaining the technical result consisting in increasing the hygiene conditions of the container's usage.

Figure 1 presents the container (general view and longitudinal section) in the extended position, wherein the container's vessel has a conical wall; Figure 2 presents a general view and the longitudinal section of the container, illustrated on Figure 1, in the collapsed position; Figure 3 presents the longitudinal section of the container wherein the resilient portions of the vessel side wall are built as convex; Figure 4 presents the longitudinal section of the container, wherein the resilient portions of the vessel side wall are built as concave; Figure 5 presents the longitudinal section of the container, wherein the resilient portions of the vessel side wall have sinusoid-like form in the longitudinal section; Figure 6 presents the longitudinal section of the container's extended position, the container having a vessel provided with a ring-shaped collar on its base and a gripping element in the form of a semi-circle, as well as a case having a ring-shaped protuberance on its inner surface to secure tight fitting of the vessel on the case; Figure 7 presents a general view and the longitudinal section of the container, illustrated on Figure 6, in the collapsed position; Figure 8 presents a variant of the extended position of the container illustrated on Figure 6; Figure 9 presents an application variant of the container's vessel, illustrated on Figure 6, as a lid for jars.

The container (Fig. 1) has the conical vessel 1 with resilient side wall provided with the rigid ribs 2 which are built so that the inner diameter of each subsequent rigid rib, beginning from the base, is larger than the preceding rib, with the difference between these diameters being equal to at least two thicknesses of the vessel 1 side wall.

$$(D'' - D') > 2S.$$

$D'$  is the outer diameter of the preceding, beginning from the base, rigid rib;

$D''$  is the inner diameter of the subsequent rigid rib;

$S$  is the side wall's thickness.

The rigid ribs 2 may be built from either a material different from the vessel 1 side wall, or from the same material the side wall is built from, the ribs being made in the form of ring-shaped thickened portions of the side wall. The side wall's resilient portions 3 located between the rigid ribs 2 can be made, in the longitudinal section, as either rectilinear (Fig. 1), convex (Fig. 3), concave (Fig. 4), or sinusoid-like (Fig. 5).

Figure 6 presents the container provided, in addition to the vessel 1, with a case 4. Moreover there is a ring-shaped collar 5 made on the base of the vessel 1, while the case 4 has, on its inner surface, a ring-shaped protuberance 6 to provide a tight fitting of the vessel 1 on the case 4. The vessel 1 also contains a gripping element in the form of a rotatable semi-circle 7 which is fixed in the lower rigid rib 2. In addition, vessel 1 has a cylindrical portion 8 and a ring-shaped locking protuberance 9 on its inner surface at the location of the upper rigid rib.

The container is used in the following way.

In the extended position the container is used for its functional application, i.e. for drinking, storage and transportation of liquid and non-liquid products or materials.

The container is collapsed in order to decrease the size and provide convenience in transporting and storage of the empty container.

Before the container is collapsed, it is positioned on a firm and even surface with the container's bottom turned upwards. Collapsing the container is performed by applying pressure in the downward direction to the base and the rigid ribs 2 of the vessel 1. In this process the base and the rigid ribs 2 move downwards without significant changes in their form and size, while the resilient portions 3 are resiliently deformed and positioned between the rigid ribs 2 (Fig. 2). In the collapsed position of the container the resilient portions 3 take a sinusoid-like form in the longitudinal section. Such a form of the resilient portions 3 provides stability in the container's collapsed position after the discontinuance of the pressure applied to the base and the rigid ribs 2 of the vessel 1.

As the difference between  $D''$  and  $D'$  diameters is decreased, the projection of parts of the deformable resilient portions 3 above and under the rigid ribs 2 is increased. Such projection is maximal when the difference between  $D''$  and  $D'$  diameters is equal  $2S$  [i.e.] doubled thickness of the vessel 1 side wall. This is the maximal value for which it is still possible to position the parts of the deformable resilient portions 3, where they fold, between the rigid ribs 2, and therefore this difference of diameters is the limiting condition of the container's collapsibility.

Making the resilient portions 3 of the vessel 1 either convex (Fig. 3), concave (Fig. 4), or sinusoid-like (Fig. 5) in the longitudinal section defines the direction of its deformation in the process of collapsing the container and thus facilitates this process.

The container may be provided with the case 4 (Fig. 7, 8) for protection from dust and dirt getting into the vessel 1. Moreover, the case 4 (Fig. 6) may be used as a removable base of the vessel 1 for increasing its stability in the extended position. Fixing the vessel 1 on the case 4 is performed by slipping its ring-shaped collar 5 onto ring-shaped protuberance 6 of the case 4. Slipping [of the collar] with interference fitting results in tightens of such fixing, which increases the comfort of use of the container.

Removing the vessel 1 from the case 4 is preformed by applying multi-directional axial force onto the vessel 1 and the case 4.

Extending the container may be performed by applying force to the bottom of the container's vessel 1 while simultaneously preventing the movement of the upper rigid rib 2. However, this method of extending can not be considered as hygienic, as there is a possibility of dust and dirt getting into the inner surfaces of the vessel 1 during the application of force to the bottom of the container's vessel 1. Hygienic conditions of the container during extending can be securely provided only by applying expanding forces onto the outer surfaces of the vessel 1. This condition is fulfilled by providing one or several gripping elements on the lower rigid rib 2 or the base of the vessel 1. In the vessel 1 illustrated on Fig. 6, 7, 8, and 9 the gripping element is a rotatable semicircle 7. Extending the container, the vessel of which contains one or several gripping elements, is performed by applying force in the direction of the extension onto one or several gripping elements while simultaneously preventing the movement of the upper rigid rib of the vessel. Extending of the container illustrated on Fig. 7 is performed after turning the semicircle 7 to the plane of the container's parallel axis. Making the gripping element in the form of a rotatable semicircle 7 provides, in addition to the comfort of holding, high compactness of the container in the collapsed position due to the possibility of turning it over the plane of the container's vessel base.

In the event the container's vessel contains, on its inner surface at the place where the upper rigid rib is positioned, a cylindrical portion and one or several locking protuberances, it can be used as a lid for jars, whereas such vessel may be used as a lid for jars with either ring-shaped or threaded mouth, depending on the form and number of the locking protuberances. The vessel 1, illustrated on Fig. 6, may be used as a lid for jars with ring-shaped mouth (Fig. 9).

### **Formula of the invention**

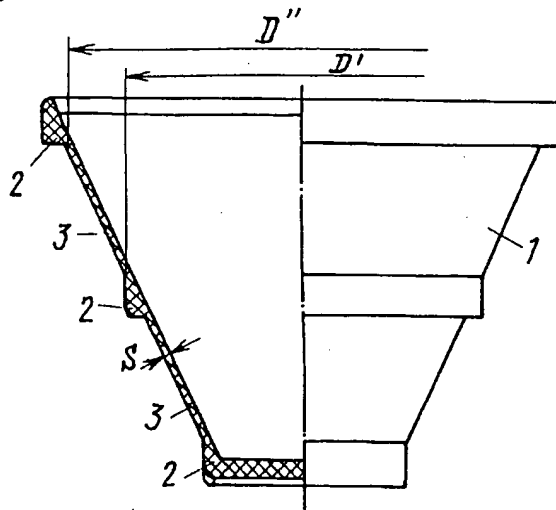
1. COLLAPSIBLE CONTAINER having a conical vessel, the side wall of which is made of a resilient material and is provided with rigid ribs which are made so that the inner diameter of each subsequent rigid rib, beginning from the base, exceeds the outer diameter of the preceding rib, its characteristic feature being that the difference between the inner diameter of each subsequent rib and the outer diameter of the preceding rib is equal to at least two thicknesses of the vessel side wall.

2. The container described in section 1, its characteristic feature being that the longitudinal section of the resilient portions of the vessel side wall which are fixed between the rigid ribs, have either a convex, concave, or sinusoid-like form.

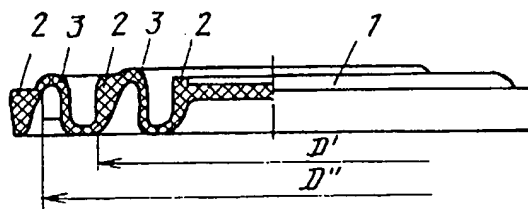
3. The container described in sections 1 and 2, its characteristic feature being that the vessel has a ring-shaped collar on its base and is provided with a case, on the side wall of which there is a ring-shaped protuberance to secure a tight fitting of the vessel onto the case.

4. The container described in sections 1 or 2, its characteristic feature being that the lower rib or the base of the container's vessel contains one or several gripping elements.

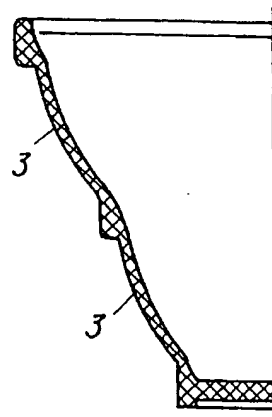
Figure 1  
Figure 2  
Figure 3



Фиг. 1

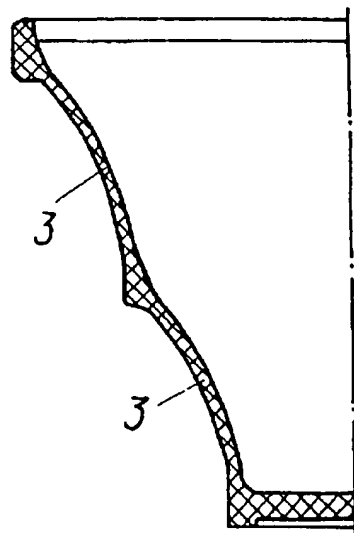


Фиг. 2

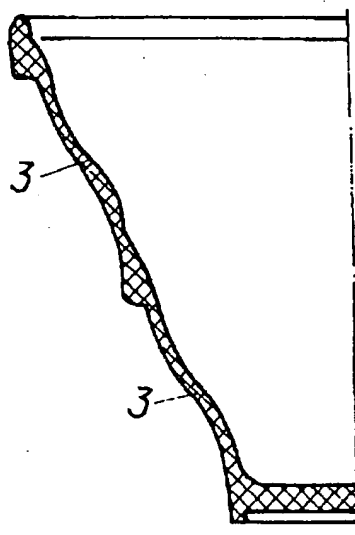


Фиг. 3

Figure 4  
Figure 5



Фиг. 4

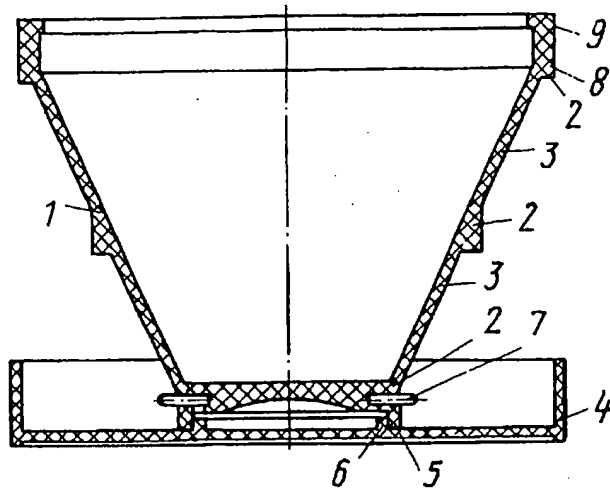


Фиг. 5

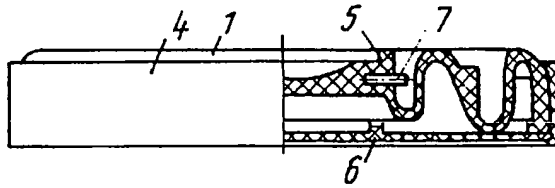
Figure 6

Figure 7

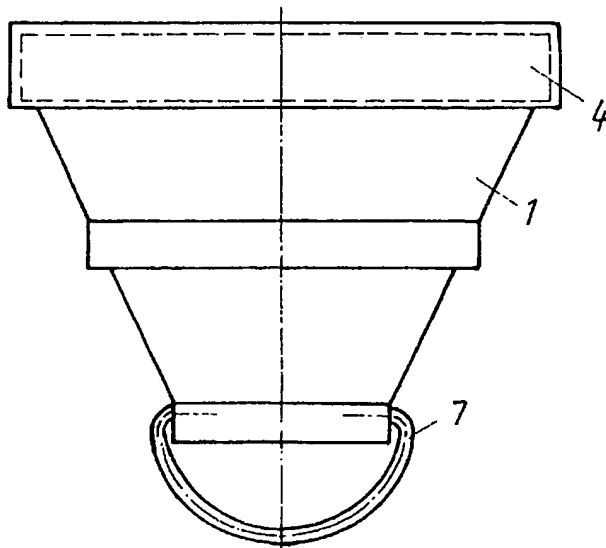
Figure 8



Фиг. 6

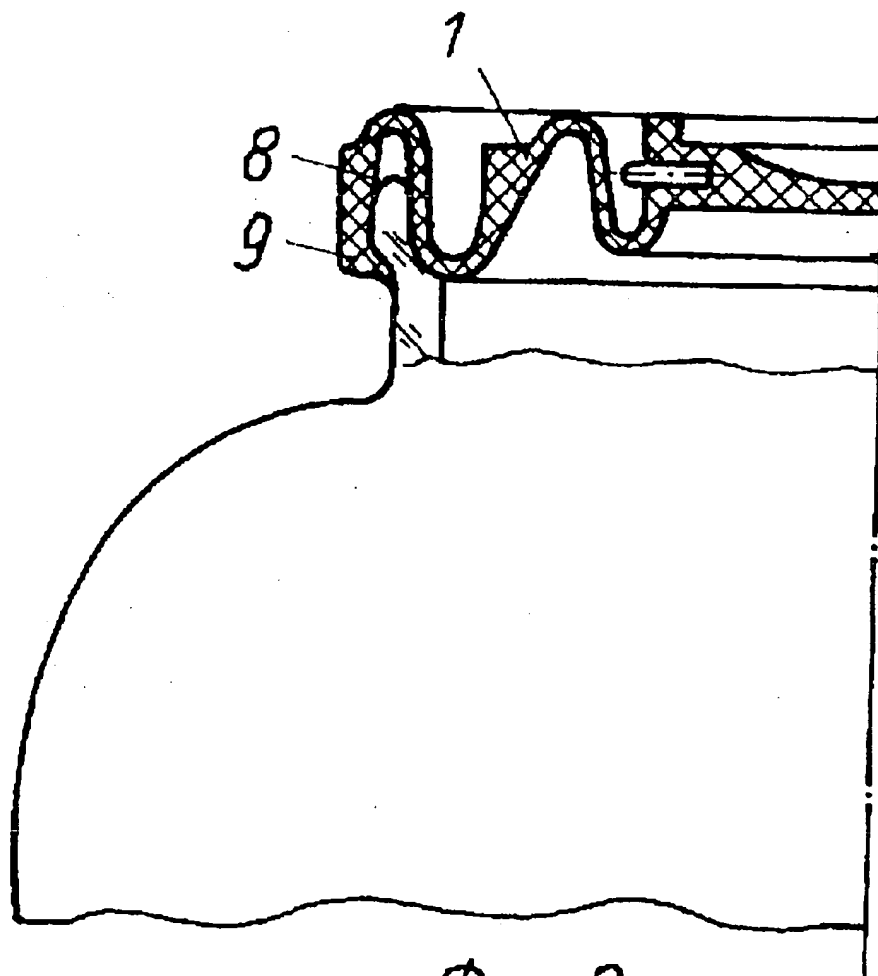


Фиг. 7



Фиг. 8

Figure 9



Фиг. 9